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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/243,689	02/03/1999	RICHARD M. WASSERMAN	101473	2795

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EXAMINER	
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ART UNIT	PAPER NUMBER
2123	18

DATE MAILED: 04/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/243,689	WASSERMAN, RICHARD M.	
	Examiner	Art Unit	
	Eduardo Garcia-Otero	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 February 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *45-72* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *45-72* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION: first action after RCE

Introduction

1. Title is: HARDWARE SIMULATION SYSTEMS AND METHODS FOR VISION INSPECTION SYSTEMS
2. First named Inventor is: WASSERMAN.
3. Claims 45-72 of US Application 09/243,689 filed on 2/3/99, are presented for examination.
4. This Action is in response to Applicant's Request for Continued Examination, received 2/24/03.
5. Claims 1-11, 13-18, 20-27, and 29-44 (all pending claims) have been cancelled.
6. New Claims 45-72 have been added.
7. As noted in the prior advisory action, all objections regarding the specification and drawings have been withdrawn, and the request for information has been satisfied.

Index and Definitions

8. **Stevenson** refers to "Modeling optical vision systems with innovative software" by Michael Stevenson et al., Vision Systems Design, January 1999, pages 29-35 (from IDS).
9. **Thomas** refers to US Patent 5,137,450 (from PTO form 892).
10. **Webster** refers to Webster's Third New International Dictionary, Merriam-Webster Inc, CD version 2.5, copyright 2000.

    focus-
    1 : a point at which rays (as of light, heat, sound) converge or from which they diverge or appear to diverge; specifically : the point where the geometrical lines or their prolongations conforming to the rays diverging from or converging toward another point intersect and give rise to an image after reflection by a mirror or refraction by a lens or optical system
    2 a : FOCAL LENGTH <a telescope of twenty-feet focus> b : adjustment (as of the eye or an eyepiece) for distinct vision <a telescope or microscope comes sharply to focus> c : the position in which something must be placed (as in relation to a camera lens) for clearness of image or clarity of mental perception <the whole scene was difficult to bring into focus> <brought into immediate focus the meaning of the war> d : the area that may be seen distinctly by the eye or resolved into a clear image by a lens <wide-focus lens camera>
    3 : one of the points that with the corresponding directrix defines a conic section <conic foci>...
        –in focus : having or giving the proper sharpness of outline due to good focalization — used of an optical instrument or its parts or of an image

depth of field
: the range of distances of the object in front of a camera lens or other image-forming device measured along the axis of the device throughout which the image has acceptable sharpness
depth of focus
1 : the range of distances of the image behind a camera lens or other image-forming device measured along the axis of the device throughout which the image has acceptable sharpness
2 : DEPTH OF FIELD — not used technically
focal length
: the distance from the principal point of a lens or concave mirror to the principal focus

11. **Computer User's Dictionary** refers to MicroSoft Press Computer User's Dictionary, Microsoft Press, 1998, ISBN 1-57231-862-7.

graphical user interface-
A type of environment that represents programs, files, and options by means of icons, menus, and dialog boxes on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, by using the keyboard...

New Matter

12. The new claims are replete with new matter.

13. MPEP 608.04(a) states "Matter not in the original specification, claims, or drawings is usually new matter", and "new matter must be clearly identified by the examiner", and "If the new matter has been entered into the claims... should be rejected under 35 USC 112 first paragraph, because the new matter is not described in the application as originally filed". See also 37 CFR 1.121(f). See also MPEP 608, 706.03(c), 2163.03, and 2163.07 regarding basis in disclosure.

Claim Rejections - 35 USC § 112- first paragraph- description

14. The following is a quotation of the first paragraph of 35 U.S.C. 112: The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

15. **Claims 46-49, 51, 53, 62, 64** are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the disclosure in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

16. The claims are replete with new matter:
17. Claim 46 states "determines that a first part... discernably better focus". Although the specification does describe focus, there is not adequate description of how to determine if a part has "discernably better focus" than another part. This is new matter because there is no disclosure of discerning better focus.
18. Claim 47 states "appears and operates substantially similarly". This is new matter because there is no disclosure of substantially similar operation.
19. Claim 48 states "manual motion control". This is new matter because there is no disclosure of manual motion control.
20. Claim 49 states "plurality of lenses". This is new matter because there is no disclosure of using multiple lenses.
21. Claim 51 states "graphical user interface". This is new matter because there is no disclosure of graphical user interfaces.
22. Claim 53 states "at least one of a) a stage light and b) a coaxial light of the machine vision inspection system". This is new matter because there is no disclosure of specific types of lighting, in particular there is no disclosure of coaxial lights.
23. Claim 62 states "generates the current focus-dependent synthetic image... substantially similar to an image data format associated with the actual camera image processing of the machine vision inspection system". This is new matter because there is not adequate disclosure of image data formats.
24. Claim 64 states "external view representing the overall configuration of the machine vision inspection system". This is new matter because there is not adequate disclosure of external views.

Claim Rejections - 35 USC § 112-Second Paragraph-indefinite claims

25. The following is a quotation of the second paragraph of 35 U.S.C. 112: The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
26. **Claim 46 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite** for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

27. Claim 46 states "determines that a first part... discernably better focus". This is vague and indefinite because although the specification does describe focus, there is not adequate definition of "discernably better focus". For example, a part may appear in focus at an initial magnification, but may appear out of focus at a higher magnification. Further, it is not clear if the "discerning" is performed by a human eye, or by some mathematical algorithm.

Claim Rejections - 35 USC § 102(a)

28. The following is a quotation of 35 U.S.C. 102(a) which forms the basis for the rejections under this section in this Office action: (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

29. Claims 45, 46, 48, 49, 50, 53, 56 are rejected under 35 U.S.C. 102(a).

30. Claim 45 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.

31. Claim 45 is an independent "system" claim, with 5 limitations labeled A-E by the Examiner for clarity. Note that A has three subparts, B has 2 subparts, and E has 3 subparts. Said subparts are numerically labeled by the Examiner for clarity.

32. A1-**user interface... display a synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30. Further note that these displays show tool bars and legends which are part of the user interface.

33. A2-[user interface...] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

34. A3-[user interface...] **input portion for receiving CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."

35. B1-**hardware component simulation system... first portion... including a limited depth of field of the sense system** is disclosed by Stevenson at page 32 "functional limitations

inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

36. B2-[hardware component simulation system]... **second portion... relative position** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
37. C-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.
38. D-**control instruction generating portion** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that to "decide" the "proper" parameters inherently means controlling them with instructions.
39. E1-is operable to... focus dependent synthetic image... based on **at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

40. E2-**display the current focus-dependent synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30.
41. E3-**generate at least one control instruction** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that to "decide" the "proper" parameters inherently means controlling them with instructions.
42. Claim 46 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
43. Claim 46 depends from Claim 45.
44. **at least one control instruction... determines that a first part... will have discernably better focus... and that a second part... will [have] discernably poorer focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that Webster defines "depth of focus" as "the range of distances of the image behind a camera lens or other image-forming device measured along the axis of the device throughout which the image has acceptable sharpness". Thus, any part of an object positioned in the "depth of focus" will have "acceptable sharpness". Additionally, note page 34 states "every optical-vision system has unique values determining its formal range of best focus".
45. Claim 47 is rejected under 35 U.S.C. 103.
46. Claim 48 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
47. Claim 48 depends from Claim 45.
48. **the at least one control element that affects the focus of the synthetic image comprises at least one of a) a focusing control element...** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their

system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

49. Claim 49 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
50. Claim 49 depends from Claim 45.
51. **plurality of lenses** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that if the physical system contained a plurality of lenses, then the analysis would inherently model the plurality of lenses. Further note that the use of lenses in series is well known in the art (telescopes), and the use of swapping lenses in a system is also well known in the art (microscopes).
52. Claim 50 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
53. Claim 50 depends from Claim 45.
54. **displays a modified current focus dependent synthetic image in response to a modification of at least one of a) the current state of the user-alterable control elements...** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that Claim 45 limitation A2 defines "user-alterable control elements" as "comprising at least one control element that affects the focus".
55. Claim 53 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
56. Claim 53 depends from Claim 52.
57. **at least one of a) a stage light and b) a coaxial light of the machine vision inspection system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

58. Claim 55 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.
59. Claim 55 is an independent claim, with 6 limitations A-F. Limitation A has 2 subparts, C has 2 subparts, and F has 3 subparts.
60. A1-**user interface... display a synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30. Further note that these displays show tool bars and legends which are part of the user interface.
61. A2-[user interface...] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
62. A3-[user interface...] **at least one control element... image inspection operation** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".
63. B-**input portion for receiving CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."
64. C1-**hardware component simulation system... first portion... including a limited depth of field of the lense system** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
65. C2-[hardware component simulation system]... **second portion... relative position** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

66. D-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.
67. E-**control instruction generating portion** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that to "decide" the "proper" parameters inherently means controlling them with instructions.
68. F1-is operable to... focus dependent synthetic image... based on **at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
69. F2-**display the current focus-dependent synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30.
70. F3-**perform an image inspection operation based on the current focus-dependent synthetic image** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

71. Claim 56 is rejected under 35 U.S.C. 102(a) as being anticipated by Stevenson.

72. Claim 56 depends from Claim 55, with one additional limitation

73. **generate at least one control instruction usable in an inspection program** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

Claim Rejections - 35 USC § 103

74. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

75. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

> Determining the scope and contents of the prior art.
> Ascertaining the differences between the prior art and the claims at issue.
> Resolving the level of ordinary skill in the pertinent art.
> Considering objective evidence present in the application indicating obviousness or nonobviousness.

76. Claims 47, 51, 52, 54, 57-72 are rejected under 35 U.S.C. 103(a) as being unpatentable.

77. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

78. Claim 47 depends from Claim 45.

79. Stevenson does not expressly disclose the additional limitation.

80. control element that affects the focus of the synthetic image appears and operates substantially similarly to a control element included in a user interface of the machine vision inspection system is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. Note Column 5 line 39 states "simulated heads-up display to complete the simulation for a typical tactical fighter". Thus, it is well known in the art to simulate the user interface as closely as possible for training purposes, even down to the pilot's chair.

81. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have

been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time. Further, the actual user interface hardware may also be used in order to save time and money.

82. Claim 51 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.
83. Claim 51 depends from Claim 45, with three additional limitations.
84. A-**graphical user interface including user-alterable control elements and an image display portion** is disclosed by Stevenson at the figure on page 29. Note the toolbars that form part of the graphical user interface.
85. Stevenson does not expressly disclose the remaining limitations.
86. B-**the substantially similar graphical user interface** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. Note Column 5 line 39 states "simulated heads-up display to complete the simulation for a typical tactical fighter". Thus, it is well known in the art to simulate the user interface as closely as possible for training purposes, even down to the pilot's chair. If the actual system being replicated contained a graphical user interface, then the simulation trainer would also have a similar graphical user interface. Additionally, note that Specification page 1 line 21 states "Off-line programming software tools are popular". The phrase "off-line" implies that the actual user interface is used, while only the measuring machines and robots are simulated.
87. C-**majority of the user-alterable control elements typically appear and operate substantially similarly in both the off-line programming system and the machine vision inspection system** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. Additionally, note that Specification page 1 line 21 states "Off-line programming software tools are popular". The phrase "off-line" implies that the actual user interface is used, while only the measuring machines and robots are simulated.
88. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have

been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time. Further, the actual user interface hardware may also be used in order to save time and money.

89. Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.
90. Claim 54 depends from Claim 45, with three additional limitations.
91. B-**hardware component simulation system processes the input operation instructions in order to generate the current focus-dependent synthetic image** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
92. Stevenson does not expressly disclose the remaining limitations.
93. A-**input operation instructions which are substantially similar to the... machine vision inspection system** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and the input operation instructions are implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17.
94. C-**hardware component simulation system generates the current focus-dependent synthetic image... substantially similar to... the machine vision inspection system** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and the input operation instructions are implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17.
95. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating

the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

96. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

97. Claim 57 is an independent claim, with 5 limitations A-E. Limitation A has 4 subparts, C has 2 subparts, and E has 3 subparts.

98. A2-[user interface...] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

99. A3-[user interface...] **at least one control element... image inspection operation** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

100. A4-**majority of the user-alterable control elements typically appear and operates substantially similarly in both the machine vision inspection simulation system and the machine vision...** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and any graphical user interface is implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including the control elements.

101. B-**input portion for receiving CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."

102. C1-**hardware component simulation system... first portion... including a limited depth of field of the lense system** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-

source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

103. C2-[hardware component simulation system]... **second portion... relative position** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

104. D-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.

105. E1-is operable to... focus dependent synthetic image... based on **at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

106. E2-**display the current focus-dependent synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30.

107. E3-**perform an image inspection operation based on the current focus-dependent synthetic image** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

108. Stevenson does not expressly disclose the remaining limitations.

109. A1-**user interface substantially similar to the graphical user interface of the machine vision inspection system... display a synthetic image** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and any graphical user interface is implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including graphical user interfaces. Note that graphical user interfaces are well known in the art, and are defined by Computer User Dictionary (1998) as "A type of environment that represents programs, files, and options by means of icons, menus, and dialog boxes on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, by using the keyboard...".

110. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

111. Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

112. Claim 58 depends from Claim 57, with one additional limitation.

113. **plurality of lenses** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated". The mathematics of multiple lenses in series is well known in the art, and common in telescopes. Additionally, swapping multiple lenses is well known in devices such as microscopes.

114. Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

115. Claim 59 depends from Claim 57, with one additional limitation.

116. at least one of a) the current state of the user-alterable control elements [focus], b) the current lens system representation of the first portion [depth of field], and c) the current state representation of the second portion [relative position] is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

117. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

118. Claim 60 depends from Claim 57, with 3 additional limitations.

119. **current state of a lighting system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

120. **at least one control element that affects the apparent** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

121. at least three of a) the **current state of the user-alterable control elements [focus], b) the current lens system representation of the first portion [depth of field], and c) the current state representation of the second portion [relative position] and the current state representation of the third portion [image inspection]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

122. Note that the Examiner is interpreting "third portion" as meaning "image inspection" in view of parent claim 57.

123. Claim 61 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

124. Claim 61 depends from Claim 60, with 1 additional limitations.

125. **at least one of a) a stage light and b) a coaxial light of the machine vision inspection system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

126. Claim 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

127. Claim 62 depends from Claim 57, with 3 additional limitations.

128. A-**user-alterable control elements [focus]... substantially similar to... the machine vision inspection system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

129. B-**generate the current focus-dependent synthetic image** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution", and the displayed images at page 29 and page 30.

130. C-**generates the current focus-dependent synthetic image... substantially similar to an image data format associated with the actual camera image processing of the machine vision inspection system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging

camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

131. Claim 64 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

132. Claim 64 depends from Claim 57, with 1 additional limitations.

133. **external view representing the overall configuration of the machine vision inspection system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

134. Claim 65 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

135. Claim 65 is an independent claim, with 4 limitations A-D. Limitation A has 2 subparts, B has 2 subparts, and D has 4 subparts.

136. A2-[user interface...] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

137. B1-**hardware component simulation system... first portion... including a limited depth of field of the lens system** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

138. B2-**hardware component simulation system... first portion... including a limited depth of field of the lens system** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

139. C-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.

140. D1-**inputting CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."

141. D2- **focus dependent synthetic image... based on at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

142. D3-**displaying** is disclosed by Stevenson at page 29 figure and page 30 figures.

143. D4-**generating at least one control instruction... based at least partially on the current state of the user-alterable control elements [focus]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

144. A1-**user interface... display a synthetic image representative of an image acquired by the machine vision system** is disclosed by Thomas at FIG 3, and at Column 5 line 39 "simulated heads-up display". Note that the simulated heads-up display includes machine

vision images such as radar acquired artificial horizon and enemy fighters. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and any graphical user interface is implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including graphical user interfaces. Note that graphical user interfaces are well known in the art, and are defined by Computer User Dictionary (1998) as "A type of environment that represents programs, files, and options by means of icons, menus, and dialog boxes on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, by using the keyboard...".

145. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

146. Claim 66 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

147. Claim 66 depends from Claim 65, with 1 additional limitation.

148. **altering the at least one control element that affects the focus of the synthetic image** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

149. Claim 67 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

150. Claim 67 depends from Claim 65, with 1 additional limitation.

151. **displaying a modified current focus-dependent synthetic image... at least one of a) the current state of the user-alterable control elements [focus], b) the current lens system representation of the first portion [depth of field], and c) the current state**

representation of the second portion [relative position] is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

152. Claim 68 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

153. Claim 68 depends from Claim 65, with 1 additional limitation.

154. **at least one control element... image inspection operation** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

155. Claim 69 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

156. Claim 69 is an independent claim, with 7 limitations A-G. Limitation A has 4 subparts, B has 2 subparts.

157. A2-[user interface...] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

158. A3-[user interface...] **at least one control element... image inspection** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

159. B1-**hardware component simulation system... first portion... depth of field** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the

proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

160. B2-**second portion... relative position and the [third] portion... inspection** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

161. C-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.

162. D-**inputting CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."

163. E-**focus-dependent synthetic image... based on at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

164. F-**displaying the current focus-dependent synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with

high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30.

165. G-**operating at least one control element which is operable to perform an image inspection operation** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

166. Stevenson does not expressly disclose the remaining limitations (A1 and A4).

167. A1-**user interface... display a synthetic image representative of an image acquired by the machine vision system** is disclosed by Thomas at FIG 3, and at Column 5 line 39 "simulated heads-up display". Note that the simulated heads-up display includes machine vision images such as radar acquired artificial horizon and enemy fighters. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and any graphical user interface is implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including graphical user interfaces. Note that graphical user interfaces are well known in the art, and are defined by Computer User Dictionary (1998) as "A type of environment that represents programs, files, and options by means of icons, menus, and dialog boxes on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, by using the keyboard...".

168. A4-**majority of the user-alterable control elements [focus] and image processing tools typically appear and operate substantially similarly** is disclosed by Thomas at FIG 3. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including control elements and image processing tools.

169. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

170. Claim 70 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

171. Claim 70 depends from Claim 69, with 1 additional limitation.

172. **displaying a modified current focus-dependent synthetic image... at least one of a) the current state of the user-alterable control elements [focus], b) the current lens system representation of the first portion [depth of field], and c) the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

173. Claim 71 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

174. Claim 71 depends from Claim 69, with 1 additional limitation.

175. **focus-dependent synthetic image on the current state representation of the third portion [lighting]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

176. Claim 72 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Thomas.

177. Claim 72 depends from Claim 69, with 1 additional limitation.

178. **inspection** disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

Conclusion

179. The new claims are replete with new matter.

180. All pending claims stand rejected against prior art.

181. Stevenson discloses simulating optical vision systems in great detail, including importing CAD, lens focus effects, lighting, position, inspection and so forth. However, Stevenson does not explicitly address simulating the user interface systems (both hardware and software) that inherently form an integral portion a quality-control optical vision system.

182. Thomas discloses flight simulation systems which includes an almost exact duplication of the user interface hardware, and includes simulating machine vision (radar) on a heads-up display. Thomas discloses the importance of "realistic" simulation.

Additional Cited Prior Art

183. The following US patents or publications are hereby cited as prior art, but have not been used for rejection. Applicant should review these carefully before responding to this office action.

184. Shinoda US Patent 4,639,588 discloses "**automatic imaging lens focusing** device... near focus state, a far focus state or an in-focus state" at Abstract.

185. Burns US Patent 6,298,284 discloses "the use of **two cameras with different focal lengths** allows the best focus on both the front and rear whells at the same time with no single lens compromise" at Column 5 line 25.

Communication

186. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eduardo Garcia-Otero whose telephone number is 703-305-0857. The examiner can normally be reached on Monday through Thursday from 9:00 AM to 7:00 PM.

187. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, can be reached at (703) 305-9704. The fax phone numbers for this group are:

188. (703) 746-7238 --- for communications after a Final Rejection has been made;

189. (703) 746-7239 --- for other official communications; and

190. (703) 746-7240 --- for non-official or draft communications.

191. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (703) 305-3900.

* * * *

KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER